PROPOSED SYLLABUS FOR FINAL YEAR

ELECTRONICS ENGINEERING

UNDER

S.R.T MARATHWADA UNIVERSITY,
NANDED.(M.S).

With Effect from A.Y 2011-12

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED.

TEACHING AND EXAMINATION SCHEME

Final Year (Electronics Engineering) New

(With effect from A.Y. 2011-12)

Sr.No.	Name of the Subject	Teaching scheme (Hours/ Week)	Exam scheme(Marks)				
			Paper	Test	Term Work	Practical	Total
PART-I							
1	Systems Software and Operating systems	4	80	20	-	-	100
2	Microelectronics	4	80	20	-	-	100
3	DVLSI	4	80	20	-	-	100
4	Microwave and Radar Engineering	4	80	20	-	-	100
5	Elective-I	4	80	20	-	-	100
	a) Advanced DSP						
	b) Robotics						
	c) UNIX OS						
	d) Neural Network and Fuzzy Logic						
	e) Wireless and Mobile Communication						
	f) Audio Video Engineering						
6	DVLSI Lab	2	-	-	25	25	50
7	Microwave Lab	2	-	-	25	25	50
8	Industrial Training	2	-	-	50	-	50
9	Project-I	4	-	-	100	-	100
	Total of Part-I	30	400	100	200	50	750
PART-II							
10	Computer Networks	4	80	20	-	-	100
11	Industrial Organization and Project Management	4	80	20	-	-	100
12	Optical Communication	4	80	20	-	-	100
13	Embedded Systems Design	4	80	20	-	-	100
14	Elective-II	4	80	20	-	-	100
	a) Digital Image Processing						
	b) Analog and Mixed Signals VLSI						
	c) Satellite Communication						
	d) Biomedical Electronics						
	e) Mechatronics						
	f) Speech Processing						
15	Optical Communication Lab	2	-	-	25	25	50
16	Embedded Systems Lab	2	-	-	25	25	50
17	Project-II	4	-	-	50	100	150
	Total of Part-II	28	400	100	100	150	750

NOTE:

1. ***Minimum two tests should be conducted for each theory subject and average of best two tests out of the total tests conducted should be considered as final test marks.***

PART-I
1. SYSTEMS SOFTWARE AND OPERATING SYSTEMS

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] LANGUAGE PROCESSORS AND DATA STRUCTURES: (5 hours)

Introduction, language processing activities, fundamentals of language processing and specifications, language processor development tools, allocation of data structures.

UNIT II] COMPILERS, INTERPRETERS AND LINKERS: (8 hours)

Introduction to assemblers, aspects of compilation, memory allocation, compilation of expressions and control structures, code optimization, interpreters.
Linkers: relocation and linking concept, design of a linker.

UNIT III] EVOLUTION OF 'OS' FUNCTIONS: (7 hours)

'OS' functions and their evolution, batch processing systems, multiprogramming systems, time sharing systems, real time operating system, and 'OS' structure. Definition of process, process control block, threads, interacting process.

UNIT IV] SCHEDULING AND DEADLOCKS: (5 hours)

Scheduling: scheduling, scheduling policies, job and process scheduling.
Deadlock: definition, conditions for deadlock, deadlock detection & resolution, detection algorithm, deadlock avoidance with banker's algorithm.

UNIT V] PROCESS SYNCHRONIZATION & MEMORY MANAGEMENT: (8 hours)

Definition of process precedence, precedence graph, sequence, critical section, properties of CS, process sync. With CS, producer-consumer problem, readers & writers problem, dinning philosopher, semaphores, producer-consumer & readers-writers using semaphore, critical region.
Memory management: Memory allocation preliminaries, contiguous and noncontiguous memory allocations, virtual memory using paging and segmentation.

UNIT VI] FILE SYSTEM, PROTECTION & SECURITY, DISTRIBUTED 'OS': (7 hours)
Directory structures file protection, allocation of disk space, imlementing file access, file sharing.
Encryption of data, playfair and ceaser-cipher technique, protection and security mechanism, protection of user files.
Distributed OS: Definition of distributed OS, design issues, communication protocol, networking issues.

TEXTBOOK:-
1. Dhamdhere D.M, System programming and operating system.

REFERENCE BOOK:-
1. William stallings, operating system: internas and design principals, Pearson education.
2. Silberschtz and galvin, operating system concepts.
3. William stallings, cryptography and networking.

2. MICROELECTRONICS

Theory Examination: 3 Hours, 80 Marks Test: 20 Marks

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UNIT I] SOLID STATE ELECTRONICS: (6 Hours)

Solid state materials: Bonding force in solids, Metals, Semiconductors and Insulators, Direct and indirect semiconductors. Electrons and holes, Effective mass. Intrinsic materials ,Extrinsic material, electron and hole concentrations in doped semiconductors, Charge neutrality, Conductivity and mobility, Drift and resistance effect of temperature and doping on mobility, Diffusion of carriers , The continuity equation. Crystal defects and dislocation, electronic properties of defects.

UNIT II] JUNCTIONS: (8 hours)

Fabrication of PN junctions, energy Band Model, Fermi level , Equilibrium conditions – The contact potential ,Equilibrium Fermi levels , space charge at a junction , Forward and reverse biased Junctions , reverse bias break down metal semiconductor junction .Shottky barriers ,rectifying contact , Ohmic contacts.

UNIT III] PN JUNCTION DIODE: (6 Hours)

Junction electrostatics, Derivation of depletion width, V-I characteristics of a diode. The diode equation, Characteristic, and energy band diagram, Diode circuit analysis, multiple diode circuits, tunnel diode, Photo diode, LED.

UNIT IV] BJT: (5 Hours)

Fundamentals of BJT operation, Charge Transport, Amplification with BJT, BJT fabrication, switching characteristics of BJT, switching cycle, Drift in the base region, base narrowing, Avalanche break down, Base Resistance and Emitter Crowding, Krik effect, Capacitance and Charging Times, Transient Time effect.

UNIT V] MOSFET AND CHARGE COUPLED DEVICE: (9 Hours)

Electrical Properties of the Surface, Space-Charge Region, Analysis of the Space-Charge Region, C-V Characteristics of the MOS Capacitors, Real MOS Capacitors, The Si-SiO2 system. Enhancement and Depletion type MOSFET Principle of operation and current voltage characteristics and derivation.Linear Region and Saturation Region. Effect of substrate bias. Real MOS Transistors source and drain resistances Drain current in the saturation region. Carrier Mobility in the inversion layer. Threshold voltage control, Effect of Temperature on MOSFET performance .Body effect Short channel effect, Velocity Saturation.

UNIT VI] VLSI TECHNOLOGY: (6 Hours)

Czochralski process, Oxidation, Epitaxy, Diffusion, Lithography, Basic NMOS process, N well, P well technology, Twin tub process, Silicon on Insulator Technology, Latch up Effect.

TEXT BOOK:

1. Solid State Electronics devices – By BEN G STREETMAN Sixth Edition EEE Publication.

REFERENCE BOOKS:

1. M S Tyagi Semiconductor Materials and Devices, Wiley

2. Randall, Geiger and Strader, Analysis and design of CMOS integrated circuits,

3. Weste Eshragian, Principles of CMOS VLSI Design, Addison Wesley 2000

3. DIGITAL VLSI DESIGN

Theory Examination: 3 Hours, 80 Marks Test: 20 Marks

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UNIT I] INTRODUCTION (7 Hours)

Historical perspective, issues in digital design, trends in design. Devices:MOS transistor, static behavior, dynamic behavior, secondary effects, CMOS technology, attributes, layouts, design rules, MOS as a switch, transmission gate.

UNIT II] INVERTER ANALYSIS (8 Hours)

Definition and properties, area and complexity, functionality– static behavior, performance – dynamic behavior, power, static CMOS inverter analysis, regions of operation, noise margin, bipolar /ECL inverter.

UNIT III] STATIC CMOS DESIGN (5 Hours)

CMOS Logic, ratioed logic, Pseudo NMOS, depletion load CMOS circuit design, pass transistor logic, transmission gate logic, transistor sizing, low power CMOS design, switching activity in a logic gate, glithing, short circuit currents, analyzing power consumption.

UNIT IV] DYNAMIC CMOS DESIGN (5 Hours)

Dynamic CMOS Design: Dynamic logic – basic principles, domino logic, NP-CMOS logic, DCVSL Logic

UNIT V] CMOS SEQUENTIAL CIR CUIT DESIGN (7 Hours)

Bistability, flip-flop classification, CMOS static flip-flops, master- slave and edge triggered flip-flops, dynamic sequential circuits – pseudostatic latch, dynamic two phase flip-flop, C2MOS latch, NORA CMOS, Schmitt trigger.

UNIT VI] DATAPATH DESIGN (8 Hours)

The Adder – CMOS implementations of ripple carry adder, mirror adder, carry save adder, carry look ahead adder, tradeoffs, multiplier array, Booths, Wallace tree multiplier design, shifters – barrel Shifter, logarithmic shifters. Memory Design Classification, trends, RAM design – static RAM design, dynamic RAM (DRAM), ROM design – Nand-based, Nor-based ROM, programmable logic
Array

TEXT BOOK:

1. Jan Rabey, Digital IC Design, Prentice Hall, ISBN 0-13-178609-1.
2. Weste–Eshragian, Principles of CMOS VLSI design, Addison-Wesley

REFERENCE BOOKS:

1. Hodges and Jackson, Analysis and design of Digital Ics, Mc-Graw Hill International edition, 1996.
2. Morris Mano, Computer architecture.
3. Wayne Wolf, Modern VLSI design.

4. MICROWAVES AND RADAR ENGINEERING

Theory Examination: 3 Hours, 80 Marks Test: 20 Marks

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UNIT I] MICROWAVE TUBES (7 Hours)

Microwave linear beam tubes – Klystron, Two and multi cavity klystron, reflex klystron - traveling wave tube, microwave crossed field tubes - magnetron (operation, characteristics and applications)

UNIT II] MICROWAVE SEMICONDUCTOR DEVICES (8 Hours)

Semiconductor microwaves devices - microwave transistors - tunnel diodes and FETs - transferred electron devices - Gunn diodes - (Gunn effect, operation, modes of operation, microwave generation and amplification) - LSA diodes - InP diodes, avalanche transit time devices - read diodes - IMPATT, TRAPATT.

UNIT III] MICROWAVE MEASUREMENTS (5 Hours)

Measurement of standing wave ratio, Measurement of frequency, Measurement of power, phase shift, Antenna pattern measurement.

UNIT IV] FUNDAMENTALS OF RADAR (7 Hours)

Block diagram of radar, radar equation, radar frequencies, applications of radar, introduction to Doppler and MTI radar, Doppler filter banks, digital MTI processing, Moving target detector, Pulse Doppler radar,

UNIT V] RADAR ANTENNA (8 Hours)

Functions of radar Antenna, antenna fundamental parameters: Isotropic radiator, Radiation resistance, Antenna resistance, Bandwidth, Beamwidth, Radiation pattern, Radiation intensity, Gain - Power gain Directive gain, Directivity, Antenna aperture, Efficiency, Effective aperture, effective length, Polarization, Voltage and Current relations.

UNIT VI] ANTENNA SCANNING AND TRACKING (5 Hours)

Mono pulse tracking, conical scan and sequential lobbing, low angle tracking, phased array, planner array.

TEXT BOOKS

1. Liao S. Y., *'"Microwave devices and Circuits"*, Prentice Hall of India
2. Balanis C. A. “Antenna theory analysis and design” Wiley pub
3. Skolnik, Introduction to radar system, Tata Mc-Graw Hill pub.

REFERENCE BOOKS

1. Rizzi P.A., *"Microwave Engineering*, Passive Circuits Hall of India
2. Pozar D.M., *"Microwave Engineering"*, John Wiley
3. Kamilo Feher, *Digital Communications*, Microwaves applications, PHI
4. Chatterji R., *Microwave Engineering*, Special topics, East West Press

5. Elective-I
a. ADVANCED DSP

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] INTRODUCTION TO DIGITAL SIGNAL PROCESSING: (5 Hours)

Introduction, A Digital Signal-Processing System, The Sampling Process, Discrete Time Sequences, Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear Time-Invariant Systems, Digital Filters, Decimation and Interpolation.

UNIT II] ARCHITECTURES FOR PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: (5 Hours)

Introduction, Basic Architectural Features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Features for External Interfacing.

UNIT III] PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: (10 Hours)

Introduction, Commercial Digital Signal-processing Devices, Data Addressing Modes of TMS32OC54xx., Memory Space of TMS32OC54xx Processors, Program Control. Detail Study of TMS320C54X & 54xx Instructions and Programming, On-Chip peripherals, Interrupts of TMS32OC54XX Processors, Pipeline Operation of TMS32OC54xx Processor.

UNIT IV] IMPLEMENTATION OF BASIC DSP AND FFT ALGORITHMS: (10 Hours)

Introduction, the Q-notation, FIR Filters, IIR Filters, Interpolation and Decimation Filters (one example in each case). Introduction, an FFT Algorithm for DFT Computation, Overflow and Scaling, Bit-Reversed Index Generation & Implementation on the TMS32OC54xx.

UNIT V] INTERFACING MEMORY AND PARALLEL I/O PERIPHERALS TO DSP DEVICES: (5 Hours)

Introduction, Memory Space Organization, External Bus Interfacing Signals. Memory Interface, Parallel I/O Interface, Programmed I/O, Interrupts and I / O Direct Memory Access (DMA).

UNIT VI] APPLICATIONS OF DSP USING MATLAB: (5 Hours)

Mobile communication, medical, image processing**,** Acoustic Noise Canceller, Dynamic range compression, LPC analysis and synthesis, SSB modulation, Radar tracking implementation

TEXT BOOKS:

1. "Digital Signal Processing", Avatar Singh and S. Srinivasan, Thomson Learning, 2004.

REFERENCE BOOKS:

1. Digital Signal Processing: A practical approach, Ifeachor E. C., Jervis B. W Pearson-Education, PHI,2002
2. "Digital Signal Processors", B Venkataramani and M Bhaskar TMH, 2002
3. "Architectures for Digital Signal Processing", Peter Pirsch John Weily, 2007
4. **"Digital Signal Processing"**, S.k mitra,,TMH, 2002
5. Math works manuals.
6. Applications to DSP Using Matlab by proaki

5. Elective-I
b. Robotics

Theory Examination: 3 Hours, 80 Marks Test: 20 Marks
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UNIT I] INTRODUCTION: (6 Hours)
Automation and Robotics, Definition, Basic Structure of Robots, Classification of Robots based on co-ordinate system, Present trends and future trends in robotics, Overview of robot subsystems.

UNIT II] COMPONENTS OF ROBOT SYSTEM: (3 Hours)
Manipulator, Controller, Power conversion unit etc, Specifications of robot.

UNIT III] DYNAMICS & KINEMATICS: (11 Hours)
Dynamic constraints, velocity & acceleration of moving frames, Robotic Mass Distribution & Inertia, Tension, Newton's equation, Euler equations, Dynamic Modeling of Robotic Manipulators. Homogeneous co-ordinate vector operations, matrix operations, co-ordinate reference frames, Homogeneous transformation and manipulator orientation relative points reference frames, forward solutions- Link co-ordinate frames, D-H matrix, Inverse or back solutions- problem of obtaining inverse solution, techniques of using direct & geometric approach.

UNIT IV] END **EFFECTORS AND ACTUATORS: (7 Hours)**
Different types of grippers, vacuum & other methods of gripping, overview of actuators, Internal & External sensors, position, relocking and acceleration sensors, proximity sensors, force sensors, touch slip laser range tinder, camera.

UNIT V] MOTION **PLANNING AND CONTROLLERS: (7 Hours)**
On-off trajectory, relocking and acceleration profile, Cartesian motion of manipulator, joint interpolated control, Jacobean in terms of D-H matrix, Obstacle avoidance, Basic control system, control loops of robotic system, Fuzzy controllers.

UNIT VI] ROBOT **VISION: (6 Hours)**
Machine Vision system, description, sensing, Digitizing, Image Processing and Analysis and Application of Machine Vision System, Robotic assembly sensors & Intelligent Sensors. Object recognition.

TEXT BOOKS:
1. Fundamentals of Robotics: Analysis and Control – *Robert J Schilling,* PHI, New Delhi
2. Robotic Engineering – *Klafter, Thomas, Negin,* PHI, New Delhi

REFERENCE BOOKS:
1. Robotics for Engineers – *Yoram Koren,* McGraw Hill, New York
2. Fundamentals of Robotics – T.C. Manjunath, Nandu Publishers, Mumbai
3. Robotics and Control- R. K. Mittal, I. J. Nagrath, TMH, NewDelhi
4. MEMS and Microsystems Design and Manufacture- HSU, TMH, NewDelhi

5. Elective-I
c. UNIX OS

Theory Examination: 3 Hours, 80 Marks Test: 20 Marks
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UNIT I] INTRODUCTION: (7 Hours)
System structure, user perspective, operating system services, system commands, assumptions about hardware shell programming. Bourne shell and C shell programming, variables and constants, Environments, control structures, shell script examples.

UNIT II] INTRODUCTION TO KERNEL: (5 Hours)
Architecture of UNIX, introduction to system concepts, kernel data structures, system administration.

UNIT III] BUFFER CACHE AND INTERNAL REPRESENTATION OF FILES: (8 Hours)
Buffer headers, structure of buffer pool, different scenarios for retrieval of a buffer, reading and writing disk clocks. Inodes, structure of a regular file, directories, conventions of a path name to inode, super block, inode assignment to a new file, allocation of disk blocks, and other file types.

UNIT IV] SYSTEM CALLS OF THE FILE SYSTEMS: (6 Hours)
Open, read, write, file and record coding, seek, close, file creation, creation of special files, change directory and change root, change owner and change mode, stat and fstat, pipes, dup, mounting and unmounting file system, link and unlink.

UNIT V] STRUCTURE OF PROCESS AND PROCESS CONTROL: (8 Hours)
Process states & transitions, layout &system memory, the context of a process, saving the context of a process, manipulation of the process address space, sleep. Creation, signals, termination, awaiting process termination, invoking other programs, UID of a process, changing size of a process, the shell, the system boot and the initprocess.

UNIT VI] (6 Hours)
Swapping, demand paging, hybrid system with swapping and demand paging.
I/O SUBSYSTEM: Driver interfaces, terminal drivers, streams.
INTERPROCESS COMMUNICATION: Process tracing system V IPC, sockets.

TEXT BOOKS:
1.M.J.Bach, The design of UNIX operating system, PHI.
2. R.THOMAS and J. YATES, a user guide to the (UNIX system, mc-graw hill publication).

REFERENCE BOOKS:
1. W.Richard Stevens, UNIX network programming, PHI.
2. S.PRATA, advance Unix-programmers guide, BPB.

5. Elective-I
d. Neural Network and Fuzzy Logic

Theory Examination: 3 Hours, 80 Marks Test: 20 Marks

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UNIT I] INTRODUCTION: (10 Hours)

Fundamentals and Models of Artificial Neural Systems, Neural computation: Examples and applications, Biological neurons and their artificial models, Models of artificial networks, Neural processing, Learning and adaptation, Neural network learning rules, Overview of neural networks

SINGLE-LAYER PERCEPTION CLASSIFIERS: Classification model, features, and decision regions, discriminate functions, linear machine and minimum distance classifier, Non parametric training concept, SDPTA, SCPTA, R-category discrete Perception training algorithm

UNIT II] MULTILAYER FEED FORWARD NETWORKS: (05 Hours)

Linearly non separable pattern classification, Delta learning rule for multiperceptron layer, generalized delta learning rule, feed forward recall and error back propagation training, learning factors.

UNIT III] SINGLE LAYER FEEDBACK NETWORKS: (06 Hours)

Basic concepts and dynamical systems, Mathematical foundations of discrete-time and gradient-type Hopfield networks

APPLICATIONS OF NEURAL NETWORKS: Introduction to applications in characters recognition and control systems.

UNIT IV] INTRODUCTION TO FUZZY LOGIC: (06 Hours)

Uncertainty and imprecision, Classical sets and Fuzzy sets, Classical relation and fuzzy relations, Operations on crisp and fuzzy relations. Fuzzy tolerance and equivalence

UNIT V] FUZZYFICATION AND DEFUZZIFICATION*:* (06 Hours)

Membership functions, Membership assignment, lambda cuts, Defuzzification methods

FUZZYARITHMETIC: Fuzzy numbers, vectors, extension principle, crisp functions, mapping, fuzzy transforms, interval analysis

UNIT VI] APPLICATIONS OF FUZZY LOGIC: (07 Hours)

Introduction to applications in data classification, image processing, and control systems.

NEURO-FUZZY APPROACH: Examples of neuro-fuzzy approach, application in image processing.

TEXT BOOKS:

1. J. M. Zurada, Introduction to Artificial Neural Networks, Jaico Publishing house.
2 T. M. Ross, Fuzzy logic, Mc-Graw Hill Inc.
3. Kosoko, Neural Networks and Fuzzy Systems, PHI
4. Zimermann, Fuzzy set Theory, Allied Pub.

REFERENCE BOOKS:

1. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Ed.
2. Fundamental of Neural Networks – Laurene Fausett, Pearson, 1st Ed.
3. C.T Lin & C S George Lee: Neural Fuzzy Systems, Prentice Hall.
4. Ahamad M. Ibrahim: Introduction to Applied Fuzzy Electronics, PHI.
5. Timothy J. Ross, Fuzzy Logic with Engineering Applications, 2/e, McGraw Hill.

5. Elective-I
e. Wireless and Mobile Communication

Theory Examination: 3 Hours, 80 Marks Test: 20 marks

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UNIT I] (10 Hours)

MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION: Introduction, FDMA, TDMA, Spread Spectrum, Multiple accesses, SDMA, Packet radio, Packet radio protocols, CSMA protocols,

INTRODUCTION TO WIRELESS NETWORKING: Introduction, Difference between wireless and fixed telephone networks, Development of wireless networks, Traffic routing in wireless networks.

UNIT II] (07 Hours)

WIRELESS DATA SERVICES: CDPD, ARDIS, RMD, Common channel signaling, ISDN, BISDN and ATM, SS7, SS7 user part, signaling traffic in SS7.

MOBILE IP AND WIRELESS ACCESS PROTOCOL : Mobile IP Operation of mobile IP, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol,

UNIT III] (05 Hours)

WIRELESS LAN TECHNOLOGY : Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE 802 protocol Architecture, IEEE802 architecture and services, 802.11 medium access control, 802.11 physical layer.

WIRELESS APPLICATION PROTOCOL: architecture, WDP, WTLS, WTP, WSP, WAE, WML, WML Scripts,

UNIT IV] (10 Hours)

MOBILE DATA NETWORKS: Introduction, Data oriented CDPD Network, GPRS and higher data rates, Short messaging service in GSM, Mobile application protocol.

Introduction to Mobile system: A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular system, planning a cellular system. The cellular concept: frequency reuse, Handoff strategies, co channel Interference reduction factor,

UNIT V] (05 Hours)

CELL COVERAGE FOR SIGNALS AND TRAFFIC: General introduction, obtaining Mobile point to point model, propagation over water or flat open area, foliage loss, mobile antennas.

UNIT VI] (03 Hours)

MODERN WIRELESS COMMUNICATION SYSTEM: Second generation cellular networks: (GSM) model, services offered by GSM, Third generation wireless networks.3G Technology.

TEXT BOOKS:

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, PHI, 2nd Edn. 2002.
2. Wireless Communication and Networking – William Stallings, PHI, 2003.
3. Mobile Communications- Jochen Schiller, Pearson Education, 2004.

REFERENCES:

1. Wireless Digital Communications – KamiloFeher, PHI, 1999.
2. Principles of Wireless Networks – KavehPahLaven and P. Krishna Murthy, Pearson Education, 2002.
3. Fourozan, Data communications and Networking, third edition, Tata McGraw-Hill-2004.
4. Mobile Cellular Telecommunications-William C Y Lee, 2 edn. Mc. Graw Hill.

5. Elective-I

f. AUDIO VIDEO ENGINEERING

Theory Examination: 3 Hours, 80 Marks Test: 20 Marks

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UNIT I] (06 Hours)

Color TV systems, Television basics, and color fundamentals, mixing of colors, color perception, chromaticity diagram, color TV camera and picture tubes, Display devices FL, LCD, TFT.

UNIT II] (07 Hours)

NTSC, PAL, SECAM systems, color TV transmitter, high level, low level transmitters, color TV receivers, remote control, antenna. TV alignment and fault finding with wobbuloscope and TV pattern generation, field strength meter.

UNIT III] (07 Hours)

Introduction to Digital TV, Principle of Digital TV, Digital TV signals and parameters, MAC signals, advanced MAC signal transmission, Digital TV receivers, NTSC, DTV, MPEG 2, JPEG 4 MAC production tools. Digital compression techniques, HSLD, GSID, digital TV recording technique/broadcasting

UNIT IV] (08 Hours)

HDTV standards and systems, HDTV transmitter and receiver/encoder, satellite TV, video on demand, CCTV, CATV, direct to home TV, set top box, conditional access system (CAS), introduction to 3D stereoscopic, DTV systems, digital broadcasting, case study (Cricket match, Marathon, Foot ball match).

UNIT V] (06 Hours)

Methods of sound recording and reproduction, optical magnetic recording, CD recording, CD DVD player, MP3 player, audio std. MPEG

UNIT VI] (06 Hours)

Studio Acoustics, reverberation, PA system for auditorium, Acoustic chamber, chord less microphone systems, special type of speakers/ cell phones. Introduction to satellite radio reception (world space)

TEXT BOOKS:

1. Television and video Engineering, A. M. Dhake, TMH Publication.
2. Video Demisified, Kelth jack, Penram International Publication.
3. Audio Video Systems, R.G. Gupta, Technical Education.

REFERENCE BOOKS:

1. Color TV Theory and Practice, S. P. Bali.
2. Basic TV and Video Systems, Bernard Grobb, Charles E.
3. Monochrome & Color TV, Gulathi.

6. DVLSI LABORATORY

Term Work: 25 Marks **Practical Examination: 25 Marks**

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List of Experiments:

A. Implementation using switcher cad

1) To implement AND, NAND, NOR, XOR gates using CMOS logic.
2) To implement multiplexer.
3) To implement adder.
4) Design multiplexer using transmission gate.
5) To study PLA
6) To implement basic gates using dynamic logic.
7) To implement flip-flop.

B. Explain layout rules and design basic gates.

7. MICROWAVES LABORATORY

Term Work: 25 Marks **Practical Examination: 25 Marks**

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List of Experiments: *Any 8 out of the following experiments;*

1. Study of microwave components.
2. To plot modes (characteristics) of reflex klystron.
3. Study of microwave Tee's.
4. Measurement of Guide wavelength & guide frequency in rectangular waveguide.
5. Plot V/I characteristics of Gunn oscillator.
6. Study of characteristics of Isolator and Circulator
7. PIN diode characteristics and applications
8. Study of characteristics of directional coupler for various coupling factors,
9. Calculation of directivity, isolation etc.
10. Parameter measurements of a circular waveguide.
11. Study of typical. Microwave amplifier.
12. Microwave power (Low/High) measurement
13. Study of Radiation Pattern for Helix Antenna/ Ground Plane
14. Study of Radiation Pattern for Cut Parabola/ Zeppelin
15. Experiment based on Radar Technology

8. INDUSTRIAL TRAINING

Term Work: 50 Marks

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Industrial Training

The students will undergo industrial training for duration of one month after sixth semester examination. The student shall submit a report on industrial training undergone, duly certified by the authorities from industry. The assessment of the students will be based on the confidential feedback from the industry and seminar/presentation given by the student.

9. PROJECT-I

Term Work: 100 Marks

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The project work will be carried out by a batch of at the most 3 students (preferably 2 students) working on a topic related to the electronics and allied fields. The topic may be from one of the following.

1. Laboratory work involving constructional theoretical and design aspects of the project/ system.
2. Modification aspect of existing electronics systems.
3. It can be practical need of the industry, which should involve system design aspect.
4. Survey of latest development in Electronics and allied fields.

It shall consist of the term work in the form of hand written or typed report not less than 25 pages. This should include the literature survey technical details related data that is collected & design that are required for project work part-I.

The candidate shall give a stage-1 progress demonstration on the subject chosen above in the presence of Guide.

PART-II
10. COMPUTER NETWORKS

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] INTRODUCTION: (6 Hours)

Uses of computer networks, Network Hardware, Network software, Reference Models, Example networks.

UNIT II] PHYSICAL LAYER: (7 Hours)

Theoretical basis for data communication, Guided Transmission media, Wireless Transmission, Communication Satellites, Public Switched telephone Networks, Mobile telephone system, Cable Television.

UNIT III] DATA LINK LAYER AND MEDIUM ACCESS CONTROL SUB LAYER: (7 Hours)

Data link layer design issues, Error detection and correction, Elementary data link protocols, sliding window protocols. The Channel Allocation problem, multiple access protocols, Ethernet, Wireless LANs, Broadband wireless, Bluetooth, Data link layer switching.

UNIT IV] NETWORK LAYER AND TRANSPORT LAYER: (7 Hours)

Network layer design issues, Routing algorithms, Quality of service, Inter-net working, Network layer in Inter-net. Transport service, Elements of transport protocols, simple transport protocol, and Inter-net transport protocols: UDP and TCP, Performance issues.

UNIT V] APPLICATION LAYER AND NETWORK SECURITY: (7 Hours)

Domain name system (DNS), Electronic mail, World-wide web (WWW), Multimedia.
Cryptography, Symmetric-key algorithms, Public key algorithms, Digital signatures, management of public keys, Communication security, Authentication protocols, E-mail security, Web security, Social issues.

UNIT VI] DISTRIBUTED APPLICATIONS: (6 Hours)

Abstract Syntax Notation one (ASN 1), Network Management SNMP, Electronic mail SMTP and MIME, Hypertext Transfer Protocol HTTP.

TEXT BOOK:

1. Andrew S. Tanenbaum, Computer Networks Prentice-Hall India.

REFERENCE BOOKS:

1. Willian Stalling, Data and Computer Communication, Prentice. Hall India.
2. Uyless Black, Computer Network, Prentice. Hall India.
3. V. Ahuja, Design and analysis of Computer Network, MGH.

11. INDUSTRIAL ORGANIZATION AND PROJECT MANAGEMENT

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] BUSINESS ORGANIZATION AND BASIC CONCEPT OF MANAGEMENT: (8 Hours)

Introduction, definition, type of business organization, basic concept of management, function of management, organization structure, authority, span of control, matching of jobs, types of organization structures, system concept, decision making.

UNIT II] MANAGEMENT INFORMATION SYSTEMS (MIS): (6 Hours)

Introduction, definition, needs, aim, characteristic and information system, source of information, application of MIS, design, development, implementation levels, information handling, advantages and disadvantages.

UNIT III] ORGANIZATION BEHAVIOR AND INDUSTRIAL PSYCHOLOGY: (6 Hours)

Organization behavior leadership, industrial psychology, motivation, participative management, quality circles and group decisions, industrial relation, small scale industries, project planning.

UNIT VI] INTRODUCTION TO PERT / CPM: (7 Hours)

Project management, network modeling-probabilistic model, various types of activity times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method (CPM)-critical path calculation-crashing of simple of networks.

UNIT V] INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT: (5 Hours)

Introduction, important of pm, what is project?, overview of project planning, program management and project evaluation, cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation.

UNIT VII] ACTIVITY PLANNING AND RISK MANAGEMENT: (8 Hours)

Introduction, objective, project schedule and activity, sequencing and scheduling activity, network planning models, adding time dimension, the forward pass, backward pass, identifying the critical activity, activity on arrow network, risk management: risk, categories of risk, identification, assessment, planning, management, resource allocation, monitoring and control.

TEXT BOOKS:

1. T. R. Banga, S. C. Sharma, “industrial organization and engineering economics”, Khanna publication
2. Amrine, Manufacturing Organization and Management, Pearson, 2nd Edition, 2004.

REFERENCE BOOK:

1. Bob Hughes and mike cotterell, “software project management” 4 Th edition, tata McGraw-Hall.
2. Industrial Engineering and Management O.P. Khanna Dhanpat Rai.

12. OPTICAL COMMUNICATION

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] OVERVIEW OF OPTICAL FIBER COMMUNICATION: (7 Hours)

Introduction, Historical development, general system, advantages, disadvantages, and applications of optical fiber communication, optical fiber waveguides, Ray theory, cylindrical fiber (no derivations in article 2.4.4), single mode fiber, cutoff wave length, and mode filed diameter. Optical Fibers: fiber materials, photonic crystal, fiber optic cables specialty fibers.

UNIT II] TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS: (8 Hours)

Introduction, Attenuation, absorption, scattering losses, bending loss, dispersion, Intra modal dispersion, Inter modal dispersion.

Optical sources and detectors: Introduction, LED’s, LASER diodes, Photo detectors, Photo detector noise, Response time, comparison of photo detectors.

UNIT III] FIBER COUPLERS AND CONNECTORS: (5 Hours)

Introduction, fiber alignment and joint loss, single mode fiber joints, fiber splices, fiber connectors and fiber couplers.

UNIT IV] OPTICAL **RECEIVER**: **(6 Hours)**

Introduction, Optical Receiver Operation, receiver sensitivity, quantum limit, eye diagrams, coherent detection, burst mode receiver operation, Analog receivers

UNIT V] ANALOG AND DIGITAL LINKS: (7 Hours)

Analog links – Introduction, overview of analog links, CNR, multichannel transmission techniques,
Digital links – Introduction, point–to–point links, System considerations, link power budget, rise time budget, transmission distance for single mode links, line coding, error correction, modal noise and chirping.

UNIT VI] WDM CONCEPTS AND COMPONENTS: (7 Hours)

Operational Principles of WDM, Passive components: the 2x2 Fiber Coupler, the 2x2 Waveguide Coupler, star couplers, Mach-Zehnder interferometer multiplexers, tunable sources, tunable filters. Optical Amplifiers: basic applications and types of optical amplifiers, semiconductor optical amplifiers, EDFA.

TEXT BOOKS:

1. "Optical Fiber Communication”, Gerd Keiser, 3rd Ed., MGH,
2. "Optical Fiber Communications", John M. Senior, Pearson Education. 3rd Impression, 2007.

REFERENCE BOOK:

1. Fiber Optic Communication - Joseph C Palais: 4th Edition, Pearson Education.

13. EMBEDDED SYSTEMS DESIGN

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] ARM PROCESSOR: (7 Hours)

Architecture and Programming: RISC and CISC, ARM organization, ARM Programmers model, operating modes, Exception Handling, Nomenclature, Core Extensions. ARM Assembly Language Programming, Introduction to ARM instruction set

UNIT II] PROTOCOLS: (7 Hours)

Bluetooth, IEEE 802.11 and IEEE 802.16, GPRS, MODBUS CAN, I2C and USB

UNIT III] EMBEDDED SYSTEM INTRODUCTION: (7 Hours)

History, Design challenges, Optimizing design metrics, Time to market, NRE and UNIT cost design metrics, Application of embedded systems and recent trends in embedded systems.

UNIT IV] EMBEDDED SYSTEM ARCHITECTURE: (7 Hours)

Hardware and software architecture, Processor selection for Embedded System, Memory Architecture and IO devices , Interrupt Service Mechanism ,Context switching. Device Drivers.

UNIT V] REAL TIME OPERATING SYSTEM CONCEPTS: (7 Hours)

Architecture of the kernel , Task scheduler , ISR , Semaphores , Mailbox , Message queues , Pipes , Events , Timers , Memory Management .

UNIT VI] CASE STUDY OF EMBEDDED SYSTEM: (7 Hours)

Based on Communication, Automation, Security, Automobile Fields

TEXT BOOKS:

1) Raj Kamal,"Embedded Systems "TMH.
2) Frank Vahid "Embedded System Design.
3) Sloss endrew,"ARM Developers Guide".

REFERENCE BOOKS:

1) Dr. K.V.K.K. Prasad "Embedded / Real Time Systems" Dreamtech
2) Iyer, Gupta "Embedded Real systems programming "TMH.
3) Steve Heath "Embedded System Design " Neuwans.

14. Elective-II
a) DIGITAL IMAGE PROCESSING

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] DIGITAL IMAGE FUNDAMENTALS: (04 Hours)

Elements of visual perception, Image sampling & Quantization, Some basic relationships between pixels, color fundamentals, color models, pseudo color image processing

UNIT II] IMAGE ENHANCEMENT: (06 Hours)

Basic grey level transformations, histogram processing, enhancement using arithmetic and logic operations, spatial filtering – smoothing and sharpening filters. Smoothing and sharpening frequency domain filters

UNIT III] MORPHOLOGICAL IMAGE PROCESSING : (06 Hours)

Neighborhood concepts, adjacency and distance measures, dilation & erosion, opening & closing operations, basic morphological operations such as region filling, thinning, thickening, skeletons, pruning for binary and gray scale images.

UNIT IV] IMAGE SEGMENTATION : (08 Hours)

Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, use of watersheds, image representation- chain codes, boundary descriptors & regional descriptors

UNIT V]IMAGE TRANSFORMS & COMPRESSION : (10 Hours)

Coding, interpixel and psycho visual image redundancy, fidelity criteria, Error free compression 2-D Discrete Fourier Transform, Discrete Cosine Transform – its application in Baseline JPEG , Walsh Hadamard Transform, Fast Walsh Transform, sub band coding Haar Transform – it's application as a Wavelet, multi resolution expansions, 1-D Wavelet Transform, Fast Wavelet Transform; Introduction to Gabor Transform, Introduction to Radon Transform

UNIT VI] IMAGE PROCESSING APPLICATIONS : (06 Hours)

Applications of transforms in fingerprinting, Medical applications such as tumor detection, Magnetic Resonance Imaging analysis using transforms, Morphological applications.

TEXT BOOKS:

1. Gonzalez, Woods, 'Digital Image Processing' – PHI , 2nd edition
2. Milan Sonka 'Image Processing, Analysis & Machine Vision' Thomson Publication.

REFERENCE BOOKS:-

1. Pratt W.K., 'Digital Image Processing', John Wiley, 2001
2. Jain A.K., 'Fundamentals of Digital Image Processing', PHI, 1997

14. Elective-II
b) ANALOG AND MIXED SIGNALS VLSI

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] **(06 Hours)**

Data converter fundamentals: Analog versus Digital Discrete Time Signals, Converting Analog Signals to Data Signals, Sample and Hold Characteristics, DAC Specifications, ADC Specifications, Mixed-Signal Layout Issues.

UNIT II] **(10 Hours)**

Data Converters Architectures: DAC Architectures, Digital Input Code, Resistors String, R-2R Ladder Networks, Current Steering, Charge Scaling DACs, Cyclic DAC, Pipeline DAC, ADC Architectures, Flash, 2-Step Flash ADC, Pipeline ADC, Integrating ADC, Successive Approximation ADC.

UNIT III] **(06 Hours)**

Non-Linear Analog Circuits: Basic CMOS Comparator Design (Excluding Characterization), Analog Multipliers, Multiplying Quad (Excluding Stimulation), Level Shifting (Excluding Input Level Shifting For Multiplier).

UNIT IV] **(06 Hours)**

Data Converter SNR: Improving SNR Using Averaging (Excluding Jitter & Averaging onwards), Decimating Filters for ADCs (Excluding Decimating without averaging onwards), Interpolating Filters for DAC, B and pass and High pass Sync filters.

UNIT V] **(10 Hours)**

Su-Microns CMOS circuit design: Process Flow, Capacitors and Resistors, MOSFET Switch (up to Bidirectional Switches), Delay and adder Elements, Analog Circuits MOSFET Biasing (up to MOSFET Transition Frequency).

UNIT VI] **(06 Hours)**

OPAmp Design (Excluding Circuits Noise onwards)

TEXT BOOK:

1. **Design, Layout, Stimulation ,**R. Jacaob Baker, Harry W Li, David E Boyce, CMOS Circuit, PHI Edition, 2005
2. **CMOS- Mixed Signal Circuit Design, R**. Jacob Baker, (Vol ll of CMOS: Circuit Design, Layout and Stimulation), IEEE Press and Wiley Nescience, 2002.

REFERENCE BOOKS:

1. Design of Analog CMOS Integrated Circuits, B Razavi, First Edition, McGraw Hill, 2001.

2. CMOS Analog Circuit Design, P e Allen and D R Holberg, Second Edition, Oxford University Press, 2002.

14. Elective-II
c) SATELLITE COMMUNICATION

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] OVER VIEW OF SATELLITE SYSTEMS: **(03 Hours)**

Introduction, frequency allocation, INTEL Sat.

UNIT II] ORBITS: **(10 Hours)**

Introduction, Kepler laws, definitions, orbital element, apogee and perigee heights, orbit perturbations, inclined orbits, calendars, universal time, sidereal time, orbital plane, local mean time and sun synchronous orbits, Geostationary orbit: Introduction, antenna, look angles, polar mix antenna, limits of visibility, earth eclipse of satellite, sun transit outage, leandiag orbits.

UNIT III] PROPAGATION IMPAIRMENTS AND SPACE LINK: **(08 Hours)**

Introduction, atmospheric loss, ionospheric effects, rain attenuation, other impairments.

SPACE LINK: Introduction, EIRP, transmission losses, link power budget, system noise, CNR, uplink, down link, effects of rain, combined CNR.

UNIT IV] SPACE SEGMENT: **(06 Hours)**

Introduction, power supply units, altitude control, station keeping, thermal control, TT&C, transponders, antenna subsystem.

UNIT V] INTERFERENCE AND SATELLITE ACCESS: **(09 Hours)**

Introduction, interference between satellite circuits, satellite access, single access, preassigned FDMA, SCPC (spade system), TDMA, pre-assigned TDMA, demand assigned TDMA, down link analysis, and comparison of uplink power requirements for TDMA & FDMA, on board signal processing satellite switched TDMA.

UNIT VI] DBS, SATELLITE MOBILE AND SPECIALIZED SERVICES: **(06 Hours)**

Introduction, orbital spacing, power ratio, frequency and polarization, transponder capacity, bit rates for digital TV, satellite mobile services, USAT, Radar Sat, GPS, orb communication and iridium.

TEXT BOOK:

1. **Satellite Communications**, Dennis Roddy, 4th Edition, McGraw- Hill International edition, 2006.

REFERENCES BOOKS:

1. **Satellite Communications**, Timothy Pratt, Charles Bostian and Jeremy Allnutt, 2nd Edition, John Wiley & Sons, 2003.
2. **Satellite Communication Systems Engineering**, W. L. Pitchand, H. L. Suyderhoud, R. A. Nelson, 2nd Ed., Pearson Education., 2007.

14. Elective-II
d) BIOMEDICAL ELECTRONICS

Theory Examination: 3 Hours, 80 Marks **Test: 20 marks**

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UNIT I] biomedical signals & Physiological transducers : (06 Hours)

Source of biomedical signal , Origin of bioelectric signals , recording electrodes , Electrodes for ECG , EMG & EEG .Physiological transducers : Pressure , Temperature , photoelectric & ultrasound transducers .

UNIT II] Recording Systems: (07 Hours)

Basic recording system, General considerations for signal conditioners, Preamplifiers, Main amplifiers, Signal processing techniques. Writing systems: Direct writing recorder, ink-jet recorder, potentiometric recorder, digital recorders. Biomedical recorders: ECG, EEG & EMG.

UNIT III] Patient Monitoring systems & Audiometers: (10 Hours)

Cardiac monitor , Bedside patient monitor , measurement of heart rate , blood pressure , temperature , respiration rate , Arrhythmia monitor , Methods of monitoring fetal heart rate , Monitoring labor activity .

Audiometers: Audiometers, Blood cell counters, Oximeter, Blood flow meter, cardiac output measurement, Blood gas analyzers.

UNIT IV] Modern Imaging systems: (05 Hours)

Introduction , Basic principle & Block diagram of x-ray machine , x- ray Computed Tomography (CT) , Magnetic resonance imaging system(NMR) , ultrasonic imaging system .

UNIT V] Therapeutic Equipments: (08 Hours)

Cardiac pacemakers , cardiac defibrillators , Hemodialysis machine , Surgical diathermy machine , **Physiotherapy :** Soft wave Diathermy, microwave Diathermy , Ultrasound therapy unit. Electrotherapy Equipments, Ventilators.

UNIT VI] Patients safety & Computer Applications in Biomedical field: (04 Hours)

Precaution , safety codes for electro medical equipment , Electric safety analyzer , Testing of biomedical equipment , Use of microprocessors in medical instruments , Microcontrollers , PC based medical instruments , Computerized Critical care units , Planning & designing a computerized critical care unit

TEXT BOOKS:

1. Electronics in medicine & Biomedical instrumentation by Nandini K.Jog
2. Textbook of Biomedical instrumentation by K.N.SCOTT & A.K.Mathur
3. Biomedical Engineering by S .N.Sarbadhikari

REFERENCE BOOKS:

1. Hand book of Biomedical instrumentation by R.S.Khandpur , TMH
2. Biomedical Instruments : Theory and Design by Walter Welko- Witiz and Sid Doutsch
3. Biomedical Instrumentation & Measurements by Lesile Cromwell , Fred J.Weibell & Erich A. Pfeiffer , PHI

14. Elective-II
e) MECHATRONICS

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] **(07 Hours)**

Introduction to Mechatronics, Systems, Measurement systems, Control systems, Microprocessor-based controllers, Mechatronics approach, Sensors, Transducers, and Signal Conditioning: Sensors and Transducers, Performance terminology, Displacement, position and proximity, Velocity and motion, Force, Fluid pressure, Liquid flow, Liquid level, Temperature, Light sensors, Selection of sensors, Data input by switches, Review of signal conditioning circuits

UNIT II] **(07 Hours)**

Pneumatic, Hydraulic, and Mechanical Actuation Systems: Acquisition systems, Pneumatic and hydraulic systems, Directional control valves, Pressure control valves, Cylinders, Process controlled valves, Rotary actuators, Mechanical systems, Types of motion, Kinematic chains, Cams, Gear trains, Ratchet and pawl, Belt and chain drives, Bearings, Mechanical aspects of motor selection

UNIT III] **(06 Hours)**

Representation and Electrical Actuation Systems: Data Displays, Data presentation elements, Magnetic recording, Data acquisition systems, Measurement systems, Testing and calibration, Electrical systems, Mechanical switches, Solid state switches, solenoids, D. C. Motors, A. C. Motors, stepper motors

UNIT IV] **(08 Hours)**

Systems Models Review: Mathematical models, Mechanical system building blocks, electrical system building blocks, fluid system building blocks, thermal system building blocks, Engineering systems, Rotational-translational systems, Electromechanical systems, hydraulic mechanical systems, System transfer function, dynamic response of systems, frequency response, closed loop controllers

UNIT V] **(06 Hours)**

Programmable logic controllers: PLCs, Basic structure, input output processing, programming, mnemonics, timers, interval relays and counters, shift registers, master and jump controls, data handling, analogue input/output, selection of a PLC

UNIT VI] **(06 Hours)**

Fault finding: Fault detection techniques, watchdog timer, parity and error coding checks, common hardware faults, microprocessor systems, emulation and simulation, PLC systems

Design and mechatronics: Designing, possible design solutions, case studies of mechatronic systems

TEXT BOOKS:

1. W. Bolton, *Mechatronics – Electronic control systems in mechanical and electrical Engineering, 2nd Edition*, Pearson Education Asia.

REFERENCE BOOKS:

1. Dan Necsulescu, *Mechatronics*, Pearson Education, Asia

14. Elective-II
f) SPEECH PROCESSING

Theory Examination: 3 Hours, 80 Marks **Test: 20 Marks**

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UNIT I] **(12 Hours)**

Digital models for the speech signal - mechanism of speech production - acoustic theory - lossless tube models - digital models - linear predictive coding of speech - auto correlation - formulation of LPC equation - solution of LPC equations - Levinson Durbin algorithm - Leyinson recursion - Schur algorithm - lattice formulations and solutions - PARCOR coefficients

UNIT II] **(10 Hours)**

Spectral analysis of speech - short time Fourier analysis - filter bank design -speech coding - sub band coding of speech - transform coding - channel vocoder - formant vocoder - cepstralvocoder - vector quantize coder

UNIT III] **(08 Hours)**

Speech synthesis - pitch extraction algorithms - Gold Rabiner pitch trackers -autocorrelation pitch trackers - voice/unvoiced detection - homomorphic speech processing - homomorphic systems for convolution - complex cepstnims - pitch extraction using homomorphic speech processing

UNIT IV] **(06 Hours)**

Automatic speech recognition systems - isolated word recognition - connected word recognition - large vocabulary word recognition systems - pattern classification - DTW, HMM - speaker recognition systems - speaker verification systems - speaker identification systems.

UNIT V] **(04 Hours)**

Real time applications of speech processing in industries, security, domestic purpose etc.

TEXT BOOKS:

1. Rabiner L.R. & Schafer R. W., "Digital Processing of Speech Signals", Prentice Hall Inc.

2 Thomas Parsons, "Voice and Speech Processing", McGraw Hill Series

3. Saito S. & Nakata K., '"Fundamentals of Speech Signal Processing", Academic Press, Inc.

REFERENCE BOOKS:

1. Owens F.J., "Signal Processing of Speech", Macmillan New Electronics

2. Papamichalis P.E., "Practical Approaches to Speech Coding", Texas instruments, Prentice Hall.

3. Rabiner L.R. & Gold, "Theory and Applications of Digital Signal Processing", Prentice Hall of India.

15. OPTICAL COMMUNICATION LABORATORY

Term Work: 25 Marks **Practical Examination: 25 Marks**

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LIST OF EXPERIMENTS: (Any eight)

1. Study and plot of V-I Characteristics of LED as a light source.
2. Study and Measurement of Numerical Aperture of a fiber.
3. Transmission of Digital Signals through a fiber optic link.
   a) PSK/QPSK modulation & demodulation
   b) ASK modulation & demodulation
   c) PC module
   d) To study DPSK modulation.
4. Measurement of attenuation of optical fiber cable of various lengths.
5. To Study various type of losses in Optical fibers using laser transmission.
6. To demonstrate optical amplifier design for dense WDM system using EDFA Physical Model.
7. Effect of EMI/RFI
8. Pulse broadening effect in fiber optics communication
9. To demonstrate the NRZ & RZ modulation formats in Optical Communication.
10. To study the effect of stimulated Brillouin scattering (SBS) on a fiber's transmission performance.
11. Study of modulation & Demodulation of light source by pulse width modulation technique.
12. Setting up of F. O. Voice Link using PWM.

16. EMBEDDED SYSTEMS LABORATORY

Term Work: 25 Marks **Practical Examination: 25 Marks**

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List of Practical (any eight)

1 Interfacing 4 × 4 matrix keyboard and writing a program to display a pressed key on the 7 segment LED Display.

2 Interfacing 16 × 2 character display to microcontroller/ Arm processor and writing a program to display a message in various ways

3 Interfacing 4 × 4 matrix keyboard and 16 × 2 character display to microcontroller/Arm processor and writing a program using RTOS functions to display a pressed key.

4 Interfacing RTC and PC UART to the microcontroller/ Arm processor and writing a program to display real time on the Hyper Terminal on PC.

5 Interfacing ADC to the microcontroller/ Arm processor and writing an ISR to read data from the ADC and display it on the LCD/ Hyper Terminal on PC.

6 Writing a program using RTOS functions to schedule 4 tasks with priority. The Tasks may be keyboard, LCD, LED ADC etc.

7. Implement a semaphore for any given task switching using RTOS on Microcontroller/ Arm processor.

8 Write a program to introduce timer based events for microcontroller using RTOS.

9 Write a program to implement I2C protocol on the available microcontroller/Arm processor board.

10 Implementation of algorithm /program for the microcontroller for low power mode

Outcomes: After completion of this course, student will be able to

1. Make use of I/O ports
2. Get input from keyboard and display messages on the Text LCD
3. Get data from the ADC and manipulate it.
4. Use of RTC
5. Use of RTOS in task management and intertask communication.
6. Operate Microcontroller in low power mode.

TEXT BOOKS:

1. Raj Kamal,"Embedded Systems "TMH.
2. Frank Vahid "Embedded System Design.
3. Sloss etal,"ARM Developers Guide".

REFERENCE BOOKS:

1. Dr. K.V.K.K. Prasad "Embedded / Real Time Systems" Dreamtech
2. Iyer, Gupta "Embedded Real systems programming "TMH.
3. Steve Heath "Embedded System Design " Neuwans.

17. PROJECT-II

Term Work: 50 Marks **Practical Examination: 100 Marks**

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Project part II will be continuation of project part-I under taken by the candidates in the first term. The term work shall consist of a typed report of about 60 pages on the work carried out by a batch of students in respect of the project assigned during the first term part-I and the second term Part-II.

Practical Examination: It shall consist of an oral examination based on the report submitted by the candidates and or the demonstration of the fabricated design project. The said examination will be conducted by a panel of two examiners consisting of preferably the guide working as a senior and other external examiner preferably from Industry or the university.

Note:

The candidate must bring the project part-I report and the final report completed in all respect while appearing for practical examination of the project.